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CONCERNING LICE

BY G. F. FERRIS

Probably every collector of mammals has occasionally noticed the lice that usually come out to the ends of the hairs of a mammal within a few hours after it has been killed. But that very few mammal collectors have ever taken any particular interest in these parasites is sufficiently attested by the infrequency with which they are received by entomologists and the paucity of information concerning them. And, indeed, why should mammalogists take the time to collect a group of insects that have had little enough attraction even for entomologists and that are usually spoken of in our entomological texts merely as "disgusting parasites," illustrated by one or two crude figures and grudgingly accorded a page or two of passing mention?

Yet these parasites are really of sufficient interest to merit something more than this scanty consideration. Rather than the apology for studying them, which prefaces a certain old book, there should be an apology for not studying them more. Aside from the importance accorded to the notorious "cooty" because of its disease-transmitting proclivities there are other factors that may justly entitle them to some share of our attention. The special interest of the lice in general lies in the fact that they may be made to contribute some small addition to the mass of evidence upon which our theories of evolution are based.

No one can study these insects for any length of time without being struck by certain peculiarities in the distribution of the various groups and even of the various species. Here are a few of these peculiarities, chosen more or less at random. What is the explanation of them?

The various species of *Microtus* and related genera, both in Europe and North America, have upon them the same species of louse. There are upon the various species of *Citellus* and related genera in western North America two species of lice that are apparently identical with two species which occur upon at least some of the Siberian species of *Citellus*. There is upon the llama in South America a very peculiar louse that appears to be identical with one which was originally described from the camel. There occurs upon the California sea lion a louse that is found also upon another Otariid in the Antarctic region, although these two mammal species are separated by at least the width of the tropics. There is upon the harbor seal of the California coast a louse that occurs also upon the various species of *Phoca* in the Atlan-

tic, although these seals have not had the advantage of any modern Panama Canal.

Another aspect of the same phenomenon appears when we consider the distribution of related species of lice. The nearest relative of the louse of the domestic pig is found upon the wart hogs and bush pigs of Africa. The Sciuridæ may boast of the possession of three genera of lice of which two are known only from squirrels, upon which they may be found wherever squirrels are found. The other genus is found also upon the Muridæ. The lice of the monkeys find their nearest relatives in the lice of man.

It is in fact a general rule—to which there are by all means exceptions—that a single species of louse will be found only on closely related hosts and that related species of lice will be found on related hosts.

I have said that there are exceptions to this rule, and some of them are glaring enough. One such exception is the occurrence upon *Sorex araneus* (the only Soricid that is known to possess lice) of a species that is identical with or at least very closely related to a species that occurs also on the domestic rat. Another is the occurrence upon the domestic dog and also upon foxes of a species the nearest relative of which is another species found upon the domestic sheep. And what are we to say of the louse which appears to be normal to kangaroos but which has once been taken from a dog in Africa, twice from dogs in, and once from a coyote near, San Francisco and once from a man in the Federated Malay States?

Aside, however, from these and some other disturbing exceptions the facts are fairly harmonious and their broader implications are fairly evident. It would seem that the normal occurrence of a common parasite species upon two or more geographically separated but genetically related host species may adequately be accounted for only by the assumption that the common ancestor of these hosts had upon it this same parasite species. In a manner of speaking the occurrence of the parasite upon these different host species is a part of their racial inheritance. It requires only an extension of this theory to account as well for the occurrence of related parasites upon related hosts. In fact it appears that in general the problem of the geographical distribution of the parasite species is to a very considerable degree bound up with the problem of the relationships of their hosts.

Now if we attempt to push this theory to its apparently logical conclusion we shall be led to the assumption that the original ancestor of all the mammals had upon it the original ancestor of all the lice. I

hasten to abjure any thought of such a conclusion for there are a considerable number of factors which need not be considered here but which will doubtless operate effectually to negative the apparent logic of the situation. In fact it would be a most extraordinary thing if even the roughest approximation to such a conclusion could be obtained. But how far can the theory reasonably be pushed? At what point will we be compelled to witness that "saddest of all spectacles, a beautiful theory slain by a fact?"

The only way to answer such questions is by the examination of a complete collection of the parasites of all the mammals, and the obtaining of such a collection is no easy matter. An approximation to a complete collection from the smaller mammals may eventually be obtained by the examination of the skins in the collections of our museums. The present writer, through the kindness of the authorities of the National Museum and the Field Columbian Museum, has been permitted to examine the collections in these two museums with most gratifying results. Just how gratifying the results were may be judged from the fact that when the work on the material thus gathered is complete our knowledge of these parasites will be more than doubled. But the parasites of the larger mammals can not be procured in this manner for the tanning and cleaning of the skins leaves at the most nothing but an occasional egg glued to a hair to tantalize the enthusiastic louse collector with visions of what previously must have been there.

It seems that the only way to obtain material from the larger mammals is through the interest of those by whom they are killed and it is with the hope of arousing this interest that this note is written. How scanty our information concerning the parasites of the larger mammals is may be judged by the fact that of North American mammals alone we do not know any of the lice of the caribou, elk, moose, bison, musk ox, bears, wolves, wolverine, otter, fisher or any of the cats other than the wild cat. In other words our ignorance of the lice of the larger mammals is almost complete.

The rapid disappearance of these larger species makes it imperative that anything that is to be done shall be done soon and this is an appeal to those who may have an opportunity to examine any of these larger species to do so. But little care is necessary in preserving material, dried specimens being as valuable as any others. A few lice entangled in a mat of hair and dropped into an envelope may serve to fill up the gaps in our knowledge and reduce the list of host names in the "unknown" column.

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